AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.   (Currently Amended) A <u>non-destructive</u> bond strength tester for determining certain bond strength parameters of a bonded component <u>without destroying the bonded component</u>, comprising:

an ultrasonic phaselocker <u>for generating a measurement signal used to determine bond properties</u>;

an ultrasonic transducer <u>for converting the measurement signal into an acoustic wave applied to a material including a bond</u>;

a loading device that is capable of applying stress-loads to the bond;

a controller for controlling the loading device;

a data <u>recorder</u> ~~recording device~~ to acquire <u>measurement</u> data <u>including the measurement signal from the phaselocker, load data from the controller, and a recording time</u>; and

<u>data processing circuitry</u> ~~a computer device~~ to analyze <u>the measurement</u> data <u>and</u> calculat<u>e</u>~~ing~~ certain bond strength parameters <u>associated with elastic properties of the bond</u>.

2.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the phaselocker is a pulsed-phase-locked loop.

3.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the phaselocker is a transmission/reflection oscillator ultrasonic spectrometer.

4.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the phaselocker is coupled to the bonded component via the ultrasonic transducer.

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5.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the bond strength tester is capable of altering a temperature of the bond.

6.   (Currently Amended) The~~A~~ <u>non-destructive</u> bond strength tester <u>of claim 1,</u> <u>wherein the</u> ~~for determining certain bond strength parameters of a bonded component,~~ <u>loading</u> <u>device</u> comprise<u>s</u>~~ing~~:

a force reactor capable of being attached to at least a portion of the bonded component;

a stressor capable of applying a force to the bonded component;

a coupler, wherein the coupler couples the force reactor and the stressor, such that at least the stressor is capable of being actuated and/or manipulated by the controller to apply a force to the bonded component<u>.</u>~~;~~

~~a transducer capable of converting electrical signals to acoustic waves and the~~
~~inverse;~~

~~a phaselocker that interfaces with the transducer, via a linked connection, through~~
~~the input/output interface.~~

7.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the transducer is capable of generating a compressional or shear wave as a pulse, a tone burst, a continuous wave, or a guided wave.

8.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the transducer includes multiple transducers.

9.   (Currently Amended) The <u>non-destructive</u> bond strength tester of claim 1, wherein the phaselocker includes at least some of:

an input/output interface;

a data monitoring and acquisition circuit that is capable of monitoring at least some incoming data and/or signal information from the transducer;

a memory that is capable of storing at least some ultrasonic wave propagation data and determination software;

an information database that is capable of data and/or signal processing, generation, interpretation, or analysis information;

a controller coupled to the phaselocker, the input/output interface, the data monitoring and acquisition circuit, the memory, the information database, the display manager, and the display, and configured to be capable of managing reading data from and writing data to the memory, driving and managing the transmission of data and/or signal information to and the reception of data and/or signal information from the transducer, and driving and managing operation of the force reactor and the stressor.

10.   (Currently Amended) The non-destructive bond strength tester of claim 1, wherein the phaselocker is one of a high-resolution ultrasonic interferometer system, a transmission/reflection oscillator ultrasonic spectrometer, a phase-locked-loop, or a pulsed-phase-locked-loop ultrasonic spectrometer.

11.   (Canceled).

12.   (Currently Amended) The non-destructive bond strength tester of claim 1, wherein the bond strength tester is capable of altering the temperature of the bond in a prescribed fashion while taking at least some temperature data, load data, ultrasonic data, and ultrasonic frequency data to determine bond parameters as a function of temperature.

13.   (Currently Amended) A method for <u>non-destructive</u> testing the strength of a bond of a bonded component, comprising:

coupling a phaselocker, via a transducer, to a bonded component to create an ensemble system;

acquiring at least some load data and ultrasonic frequency, ~~initial conditions~~ data for the ensemble system <u>during an initial state</u>;

applying a load to the bonded component during a load period by placing the bond under tension or compression, thereby applying stress to the bond;

acquiring at least some load data and ultrasonic frequency data from the ensemble system during the load period;

maintaining the load on the bonded component during a load-hold period;

acquiring at least some load data and ultrasonic frequency data from the ensemble system during the load-hold period;

removing the load on the bonded component during an unload period;

acquiring at least some load data and ultrasonic frequency data from system during the unload period;

acquiring at least some load data and ultrasonic frequency, ~~final conditions~~ data for the ensemble system after the load on the bonded component has been removed during a relaxation period;

determining a non-linearity parameter ~~(N)~~ from at least some of the acquired data;

~~determining a hysteresis parameter (H1) for the load-hold period from at least some of the acquired data;~~

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~~determining a hysteresis parameter (H2) for the unload period from at least some of the acquired data;~~

~~determining a plasticity parameter (P) for the relaxation period from at least some of the acquired data;~~ and

assessing the strength of the bond based on the determined <u>non-linearity</u> parameters, ~~N, H1, H2, and P and determined failure parameters~~.

14.   (Original) The method of claim 13, wherein acquiring includes acquiring via a data monitoring and acquisition circuit.

15.   (Currently Amended) The method of claim 13, further including saving at least some of the information and/or data regarding the acquired load data and ultrasonic frequency data and/or at least some of the information and/or data regarding <u>one or more</u> ~~the~~ determined parameters, ~~N, H1, H2, or P~~ to a memory.

16.   (Currently Amended) The method of claim 13, further including transmitting at least some of the information and/or data regarding the acquired load data and ultrasonic frequency data and/or at least some of the information and/or data regarding <u>one or more</u> ~~the~~ determined parameters, ~~N, H1, H2, or P~~.

17.   (Currently Amended) The method of claim 13, further including displaying at least some of the information and/or data regarding the acquired load data and ultrasonic frequency data and/or at least some of the information and/or data regarding <u>one or more</u> ~~the~~ determined parameters, ~~N, H1, H2, or P~~ on a display.

18.   (Currently Amended) The method of claim 13, further including:

altering a temperature of the bond in a prescribed fashion;

acquiring at least some temperature data for the ensemble system; and

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assessing the strength of the bond based on <u>one or more</u> ~~the~~ determined

parameters~~, N, H1, H2, and P~~ and the temperature data.

19.	(Currently Amended) The method of claim 13, further including:

comparing <u>one or more</u> ~~the~~ determined parameters~~, N, H1, H2, and P~~ to <u>one or</u>

<u>more</u> determined parameters~~, N, H1, H2, and P~~ from a prior test ~~of a~~ of a bond; and

assessing the strength of the bond based on the comparison ~~of the determined~~

~~parameters~~.

20.	(Currently Amended) A method for <u>non-destructively</u> determining at least some

bond strength parameters for a bond of a bonded component, comprising:

coupling a phaselocker, via a transducer, to a bonded component to create an

ensemble system;

acquiring at least some load data and ultrasonic frequency~~, initial conditions~~ data

for the ensemble system <u>during an initial state</u>;

applying a load to the bonded component during a load period by placing the

bond under tension or compression, thereby applying stress to the bond;

acquiring at least some load data and ultrasonic frequency data from the ensemble

system during the load period;

maintaining the load on the bonded component during a load-hold period;

acquiring a least some load data and ultrasonic frequency data from the ensemble

system during the load-hold period;

removing the load on the bonded component during an unload period;

acquiring at least some load data and ultrasonic frequency data from the ensemble

system during the unload period;

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acquiring at least some load data and ultrasonic frequency, final conditions data

for the ensemble system after the load on the bonded component has been removed during a

relaxation period; and

determining a non-linearity parameter (N) from at least some of the acquired

data.;

determining a hysteresis parameter (H1) for the load-hold period from at least

some of the acquired data;

determining a hysteresis parameter (H2) for the unload period from at least some

of the acquired data;

determining a plasticity parameter (P) for the relaxation period from at least some

of the acquired data.

21.   (New) The method of claim 20, further comprising:

determining a first hysteresis parameter for the load-hold period from at least

some of the acquired data;

determining a second hysteresis parameter for the unload period from at least

some of the acquired data; and

determining a plasticity parameter for the relaxation period from at least some of

the acquired data.

22.   (New) The method of claim 20, wherein the linearity parameter is associated with

linear and non-linear properties of the bond.

23.   (New) The method of claim 20, further comprising:

extracting non-linear velocity derivatives from changes in at least some of the

acquired data as a function of load or strain.

24. (New) The method of claim 13, further comprising:

determining a first hysteresis parameter for the load-hold period from at least some of the acquired data;

determining a second hysteresis parameter for the unload period from at least some of the acquired data; and

determining a plasticity parameter for the relaxation period from at least some of the acquired data,

wherein the assessment of the bond strength is based on one or more of the determined parameters and one or more failure parameters associated with the bond.

25. (New) The method of claim 13, further comprising:

extracting non-linear velocity derivatives from changes in at least some of the acquired data as a function of load or strain.

26. (New) The method of claim 13, further comprising:

predicting the strength of the bond based on the determined non-linearity parameter.

27. (New) The method in claim 13, wherein the non-linearity parameter is an indicator of linear and non-linear elastic properties of the bond.

28. (New) The non-destructive bond strength tester of claim 1, wherein the data processing circuitry is configured to extract non-linear velocity derivatives from changes in the measurement signal as a function of load or strain.

29. (New) The non-destructive bond strength tester of claim 1, wherein the data processing circuitry is configured to predict a strength of the bond based on the calculate bond strength parameters.

30. (New) The non-destructive bond strength tester of claim 1, wherein the data processing circuitry is configured to analyze the measurement signal to determine creep under load and recovery of plasticity after load reduction.

31. (New) The non-destructive bond strength tester of claim 1, wherein the bond strength parameters reflect linear and non-linear elastic properties of the bond.

32. (New) The non-destructive bond strength tester of claim 1, wherein the bond strength parameters include a non-linearity parameter, a hysteresis parameter, and a plasticity parameter.

33. (New) The non-destructive bond strength tester of claim 1, wherein the data processing circuitry is configured to compare the calculated bond strength parameters with predetermined bond strength parameters to predict a potential bond strength deficiency.

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